

NASA TECH BRIEF



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Study of Hydrogen Slush-Hydrogen Gel Utilization

The study of hydrogen slush-hydrogen gel utilization constitutes the first formal investigation of subcooled liquid and slush hydrogen fuels for space vehicle applications. Results of this study program are reported in two volumes. The first volume contains the physical and thermal property data for hydrogen used in the study plus complete property data from the triple point to the critical point. In the second volume, details of the technical effort are presented including parametric analysis of effects on vehicle systems and applications of subcooled hydrogen to three study vehicles.

Because it was determined that insufficient data were available on hydrogen gels, it was decided to concentrate the study effort on triple-point hydrogen. In phase 1, all available property data on subcooled (including slush) and gelled hydrogen were compiled for later use in phases 2 and 3. In phase 2, effects of using triple-point hydrogen were investigated on vehicle subsystem designs in parametric fashion. These effects were then evaluated for each of the affected vehicle subsystems prior to the phase 3 vehicle application studies.

In conducting phase 1 it was found that all of the fundamental physical and thermal properties of hydrogen needed to properly perform phases 2 and 3 were available in the literature. It was further found that additional data in the form of triple-point hydrogen flow characteristics will be required to conduct detail design of flight subsystems.

Note:

A complete report of the findings of this study is contained in Lockheed Missiles and Space Company report K-11-67-1, volumes I and II, available from:
Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B67-10413

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: C. W. Keller
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Development of a New Type of Rocket Motor

The development of a new type of rocket motor has been completed by the NASA Langley Research Center. This new motor, known as the "X-15" motor, is designed to provide a high thrust-to-weight ratio and is capable of operating at a wide range of altitudes. The motor is based on a new design that allows for a more efficient combustion process, resulting in a higher specific impulse. This new motor is expected to be used in a variety of applications, including the X-15 hypersonic aircraft and the Space Shuttle program.

The development of this new motor was a result of a collaborative effort between NASA and the X-15 program. The X-15 program is a joint venture between NASA and the U.S. Air Force, and is designed to provide a means of exploring the hypersonic regime. The new motor is a key component of the X-15 program, and its development is a significant achievement for NASA.